KORENBERG, E.I.; SEMENOVA, L.P.; SOLOSHENKO, I.Z.

Epizootology and epidemiology of leptospirosis in Yaroslavl Province. Zhur. mikrobiol., epid. i immun. 33 no.12:36-41 D '62. (MIRA 16:5)

1. Iz Instituta epidemiologii i mikrobiologii imeni Gamalei AMN SSSR.
(YAROSLAVL PROVINCE—ZOONOSES)
(YAROSLAVL PROVINCE —LEPTOSPIROSIS)

SHAL'NEVA, A.M.; GUSEV, V.M. [deceased]; TITROVA, A.I.; SOLOSHENKO, I.Z.

Role of birds in the epizootiology of leptospirosis. Zool. zhur. 42 no.5:775-777 '63. (MIRA 16:7)

1. Institute of Vaccines and Sera of Stavropol, Research Anti-Plague Institute of the Caucasus and Transcaucasia and Institute of Epidemiology and Microbiology of the Academy of Medical Sciences of the U.S.S.R., Moscow.
(Caucasus--Leptospirosis) (Birds as carriers of disease)

CHERNUKHA, Yu.G.; SOLOSHENKO, I.Z.; SEMENOVA, L.P.; DOBROVSKIY, V.N.

Materials on the epidemiology of leptospirosis in the North Ossetian A.S.S.R. Zhur. mikrobiol. epid. i immun. 40 no.5: 52-55 My '63. (MIRA 17:6)

1. Iz Instituta epidemiologii i mikrobiologii imeni Gamalei AMN SSSR.

KARASEVA, Ye.V.; SEMENOVA, L.P.; SOLOSHENKO, I.Z.; CHERNUKHA, Yu.G.; BOBROVSKIY, V.N.

Natural foci of leptospirosis in the North Ossetian A.S.S.R. Zhur. mikrobiol. epid. i immun. 40 no.5:56-60 My '63. (MIRA 17:6)

1. Iz Instituta epidemiologii i mikrobiologii imeni Gamalei AMN SSSR.

KARASEVA, Ye.V.; SOLOSHENKO, I.Z.; MELEKSETOV, M.A.

Interrelationship of the epizootic process in cattle and wild rodents in a leptospirosis focus. Zhur.mikrobiol.,epid. i immun. 41 no.5:63-66 My '64. (MIRA 18:2)

1. Institut epidemiologii i mikrobiologii imeni Gamalei AMN SSSR i veterinarnaya laboratoriya Mozdokskogo rayona Severo-Osetinskoy ASSR.

SEMENOVA, L.F.; SOLOSHENKO, I.Z.; ANAN'IN, V.V.

Leptospira of the Hebdomadis group. Report No.3: Detection of the subtype Leptospira sejroe balcanica in the Soviet Union. Zhur. mikrobiol., epid. i immun. 42 no.4:61-64 Ap '65.
(MIRA 18:5)

1. Institut epidemiologii i mikrobiologii imeni Gamalei AMN SSSR.

SOLOSHENKO, I.Z.; CHIGIRINSKIY, A.Ye.; SEMENOVA, L.P.

Experimental study on the susceptibility of small mammals to Leptospira of various serological types. Report No.3: Morphological changes in the organs of white mice caused by Leptospira grippotyphosa and sejroe. Zhur.mikrobiol., epid. i immun. 42 no.9:142-143 S '65.

(MIRA 18:12)

1. Institut epidemiologii i mikrobiologii imeni Gamalei AMN SSSR. Submitted June 3, 1964.

SOLOSHENKO, N. N., inzh.; STRAKHOV, I. P., prof.

Effect of dicyandiamide resin on the wear resistance of sole flank leather. Kozh. obuv. prom. 4 no.10:22-24 O '62. (MIRA 15:10)

(Leather) (Finishes and finishing)
(Guanidine)

MIKELADZE, G.Sh.; NADIRADZE, Ye.M.; PKHAKADZE, Sh.S.; GOGORISHVILI, B.P.; DGEBAUDZE, G.A.; SOLOSHENKO, P.S.; SEMENOV, V.Ye.; BARASHKIN, I.I.; SHIRYAYEV, Yu.S.; POSPELOV, Yu.P.; KATSEVICH, L.S.; ROZENBERG, V.L.; Prinimali uchastiye: LORDKIPANIDZE, I.S.; TSKHVEDIANI, R.N.; DZODZUASHVILI, A.G.; DUNIAVA, A.G.; PENARSKIY, L.F.; GRITSENYUK, Yu.V.; ZHELTOV, D.D.; LUZANOV, I.I.; GLADKOVSKIY, V.P.; PODMOGIL'NYY, V.P.; VOROPAYEV, I.P.; BRIKOVA, O.V.; VRUBLEVSKIY, Yu.P.; KLYUYEV, V.I.; BAYCHER, M.Yu.; LOGINOV, G.A.; SHILIN, V.K.; POPOV, A.I.; ZASLONKO, S.I.

Industrial experiments in the smelting of 45 o/o ferrosilicon in a heavy-duty closed electric furnace. Stal' 25 no.5:426-429 My '65. (MIRA 18:6)

1. Gruzinskiy institut metallurgii (for Lordkipanidze, TSkhvediani, Dzodzuashvili, Guniava). 2. Nauchno-issledovatel'skiy i proyektnyy institut metallurgicheskoy promyshlennosti (for Brikova, Vrublevskiy, Klyuyev). 3. Vsesoyuznyy nauchno-issledovatel'skiy institut elektrotermicheskogo oborudovaniya (for Baycher, Loginov, Shilin, Popov, Zaslonko).

SOV/130-58-10-2/18

AUTHOR: Soloshenko, P.S.

TITLE: Smelting High Quality Steelmaking Pig Iron with Mineral Fuel (Vyplavka peredel'nogo vysokokachestvennogo chuguna na mineral'nom toplive).

PERIODICAL: Metallurg, 1958, Nr.10, pp.4-6 (USSR)

ABSTRACT: In 1939 coke was substituted for charcoal in the smelting of low-sulphur, low-phosphorus pig iron for making acid open-hearth steel. In 1949 at the Almaznaya works the treatment of the liquid iron with special (unnamed) reagents outside the furnace enabled quality to be improved and the furnace productivity to be increased. Further plant and practice improvements were made in 1957 which led to the present value of the blast-furnace coefficient of 0.720 being achieved, the coke rate being 867 kg/ton pig iron. The author considers that an important possible improvement would be the adoption of the smelting of the low-manganese iron and notes that such practice in the South of the USSR has involved slags with about 6% MgO. The reduction of the manganese content

Card 1/3

Smelting High Quality Steelmaking Pig Iron with Mineral Fuel.

facilitates the external treatment of the iron. In March 1957 tests were carried out at the Almaznaya works with carefully analysed materials (Table 1) on the smelting of low-manganese (about 0.6 instead of about 1.5% Mn). The author compares the results of a week of this practice with a week of normal practice (Table 2, Figs.1,2): the data show that the new practice led to a 3.6-% increase in furnace productivity with smoother working and a 3-% fall in coke-rate; the iron sulphur content decreased. The author explains these improvements in terms of better hearth heat conditions; decrease in the quantity of heat for manganese reduction and the reduction in slag volume together with improvement in its quality. He concludes that with 25 mm fraction coke and lump iron ore or sinter continuous production of low-manganese iron can be undertaken, as is now being done at the Almaznaya works. This article is "Promyshlenno-ekonomicheskiy byulleten'", 1958, Nr.7, of the SNKh-Luganskiy ekonomicheskiy administrativnyy rayon (SNKh-Lugansk economic-administrative region). There are 2 figures and

Card 2/3

SOV/130-58-10-2/18

Smelting High Quality Steelmaking Pig Iron with Mineral Fuel.
2 tables.

ASSOCIATION: Almaznyanskiy metallurgicheskiy zavod (Almaznaya metallurgical works).

Card 3/3

SOLOSHENKO, V., starshiy normirovshchik

Regulation of production standards in a workshop. Sots.trud 4 no.5:112-116 My '59. (MIRA 12:8)

1. TSekh priborov No.1 Moskovskogo instrumental'nogo zavoda "Kalibr."
(Moscow--Measuring instruments) (Production standards)

SOLOSHENKO, V.; KOTKO, I.

Let us work even better. Sil'. bud. 11 no.9:3-4 S '61.
(MIRA 14:11)

1. Predsedatel' soveta Borispol'skoy mezhkolkhoznoy stroitel'skoy organizatsii Kiyevskoy oblasti (for Soloshenko).
(Kiev Province--Construction industry)

SOLOSHENKO, V.

We will fulfill the building plan successfully. Sil'.bud. 12 no.4:9 Ap '62. (MIRA 15:8)

1. Predsedatel' soveta Borispol'skoy mezhkolkhoznoy stroitel'skoy organizatsii Kiyevskoy oblasti.
(Kiev Province--Construction industry)

SOLOSHENKO, V.

To build faster and build more dwellings. Sil'. bud. 12 no.10:13 O '62. (MIRA 15:10)

1. Predsedatel' soveta Borispol'skoy mezhkolkhoznoy stroitel'noy organizatsii Kiyevskoy oblasti.

(Borispol' district—Building)
(Collective farms—Interfarm cooperation)

SOLOSHENKO, V. A.

USSR/Meteorology - Meteorological Service May 52

"Meteorological Service to Agriculture by Stavropol' Hydrometeorological Office in 1951," V. Ya. Bobrov, V. A. Soloshenko, Stavropol' Hydrometeor Office

"Meteorol i Gidrol" No 5, pp 8-12

During 1951, the Stavropol' Hydrometeorol Office supplied information to over 350 agricultural organizations. Information consisted of monthly forecasts, transmission of 3-day forecasts from

229T83

Rostov, and its own daily forecasts and storm warnings. The office published 400 issues of thrice-monthly bulletins, later discontinued, and 25 issues of daily bulletins. Publication of a booklet to help kolkhozes in establishing their own meteorological observation stations is intended.

229T83

AID P - 3856

Subject : USSR/Meteorology

Card 1/1 Pub. 71-a - 19/35

Authors : Bobrov, V. Ya. and V. A. Soloshenko

Title : Meteorological service for agriculture in the Stavropol' Kray.(From the experience of the Stavropol' hydrometeorological bureau).

Periodical : Met. i. gidr., 6, 49-50, N/D 1955

Abstract : A report is given on various services extended by the hydrometeorological stations of the area to agricultural workers in 1955.

Institution : None

Submitted : No date

SOLOSHENKO, V. A.

"Agrometeorological Conditions Favoring the Growth and Development of Corn in Stavropol'skiy Kray, Materialy po izucheniyu Stavropol'skogo Kraya, No. 8, 1956, p.29-32.

SOLOSHENKO, V. P.

USSR/ Engineering - Machine tools

Card 1/1 : Pub. 103 - 6/23

Authors : Soloshenko, V. P., and Sornev, YU. A.

Title : An automatic machine for a face-grinding of bearing races

Periodical : Stan. i instr. 8, 17-20, Aug 1954

Abstract : The editorial gives some information concerning the operation and performance of an automatic machine, type 02S34, designed for face-grinding of the inner races of cone roller-bearings. General description of the structure and individual characteristics of machine components are presented. Illustrations; diagram; drawings.

Institution : .....

Submitted : .....

SOLOSHKO, Dmitriy Petrovich; MAKEYEVA, Galina Ivanovna [Makeieieva, H.I.]; BEREZINA, Z.S., red.; LEVCHENKO, O.K., tekhn. red.

[Labor path of a collective of the Kharkov Tractor Plant] Trudovyi shliakh kolektyvu KhTZ. Kyiv, Derzh. vyd-vo polit.lit-ry URSR, 1962. 140 p. (MIRA 15:6)

1. Khar'kovskiy traktornyy zavod imeni Ordzhonikidze (for Soloshko, Makeyeva)
(Kharkov--Tractor industry) (Socialist competition)

SO USSR, F. P.

"Influence of Mechanical Properties of Alloys upon the Efficiency of the Use of Active Mediums in Cutting." Acad Sci USSR, Inst of Physical Chemistry, Moscow, 1954. (Dissertation for the Degree of Candidate of Mathematical Sciences.)

SO: M-172, 20 Feb 56

SOLOSHKO, F. P.

USSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 35/56

Authors : Epifanov, G. I.; Soloshko, F. P.; and Rebinder, P. A., Academician

Title : New method of determining the sliding friction coefficient and its application to the study of the adsorption-lubrication effect.

Periodical : Dok. AN SSSR 99/5, 801-804, Dec 11, 1954

Abstract : A new method is presented for the determination of the sliding-friction coefficient. The distinctive characteristic of this method is the existence of a nonstationary zone in which continuous conversion from rolling friction through mixed friction into sliding friction takes place. The stationary state of the system is the state of the pure sliding friction at which the system arrives gradually through asymptotic approximation. This asymptotic approximation of the system toward the stationary state, corresponding to the sliding friction, prevents any possibility for the origination of auto-vibration in the system. Such a system will have only a periodic vibrations which will lead it into a stable equilibrium state. Seven references: 6-USSR and 1-English (1933-1954). Graphs; drawing.

Institution: Academy of Sciences USSR, Institute of Physical Chemistry

Submitted : September 28, 1954

SOLOSHKO, F.P.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 24/54

Authors : Soloshko, F. P., and Epifanov, G. I.

Title : The effectiveness of liquid media during free burning of Pb-Sb Alloys

Periodical : Dok. AN SSSR 100/3, 491-493, Jan 21, 1955

Abstract : The effectiveness of liquid media on the process of cutting a binary-component alloy (Pb-Sb) was investigated with respect to the composition of the alloy. The effectiveness of the medium was evaluated by the reduction in the specific cutting operation and by the reduction in the shrinkage of the shavings. The results indicate that the effectiveness of active liquid media during the cutting of plastic and brittle bodies is different. Three USSR references (1944-1951). Graphs.

Institution : Academy of Sciences USSR, Institute of Physical Chemistry

Presented by: Academician P. A. Rebinder, July 27, 1954

SOLOSI[illegible], G.I.; DEMBO, N.G., red.; KRICHEVSKAYA, L.M., tekhn. red.

[Lomonosov; palaces, museum, parks] Lomonosov, dvortsy, muzei, parki. Moskva, Gos. izd-vo izobraz. iskus., 1958. 1 v.
(Lomonosov—Views) (MIRA 11:10)

SOLOSTEY, P.A.

Changes in the specific gravity of blood, plasma, hemoglobin and protein, and in hematocrit readings following Spasokukotskii's operation for gastric resection. Trudy LSGMI 45:287-293 '58 (MIRA 11:11)

1. Klinika fakul'tetskoy khirurgii Leningradskogo sanitarno-gigiyenicheskogo meditsinskogo instituta (zav. klinikoy - prof. P.N. Napalkov).
(STOMACH--SURGERY)
(BLOOD)

SOLOSTEY, P.A., klinicheskiy ordinator

Rentgenocholangiomanometry-graphy on the operating table. Trudy LSGMI 59:198-204 '60. (MIRA 14:9)

1. Fakul'tetskaya khirurgicheskaya klinika Leningradskogo sanitarno-gigiyenicheskogo meditsinskogo instituta (zav. klinkoy - prof. P.N.Napalkov).
(GALL BLADDER--RADIOGRAPHY)

KOCHETKOV, N. K.; VULFSON, N. S.; CHIZHOV, O. S.; SOLOTAREV, B. M.

Co-author of a paper entitled, "The Use of Mass Spectromentry in Carbohydrate Research."
19th International Congress of Pure and Applied Chemistry London 10-17 Jul 63

Institute for Chemistry of Natural Products, USSR Academy of Sciences.

SOLOTAREV, T. L., Dr. Tech. Sci, Prof.

" Methoden zur Ermittlung der Wasserkraftreserven in der UdSSR," List of General Reports and Papers presented at the Fifth World Power Conference, Vienna 1956, 10 January 1956, pg. 28

E-2298

S[illegible]TAR[illegible]VA, [illegible]

Acute epidemic con[illegible]ctivitis [illegible]oskva, [illegible]iz, 1952. [illegible]. (Bi[illegible]lioteka [illegible]ticheskogo vracha)

GRISHKO, A.G., inzh.; SOLOTAREVSKAYA, A.S.

Colored ceramic facing tiles made of local raw materials. Sbor. trud. IUZHNII no.2:148-156 '59. (MIRA 13:9)

1. Khar'kovskiy filial Nauchno-issledovatel'skogo instituta stroitel'nykh materialov i izdeliy Akademii stroitel'stva i arkhitektury USSR.
(Tiles)

Q-2

USSR / Farm Animals. Cattle.

Abs Jour : Ref Zhur - Biol., No. 14, 1958, No. 64410

Author : Solotchin, I. D.
Inst : Scientific Research Agricultural Institute of Krasnoyarsk
Title : Experience in the Raising of Dairy Cattle in the Far North

Orig Pub : Byul. nauchno-tekhn. inform. Krasnoyarskogo n.-i. in-ta s. kh., 1957, No. 1-2, 56-61.

Abstract : For a period of two decades, a complex alternate cross-breeding of the local Siberian, Yaroslavl', Kurgan, Simmenthal, Kholmogory, East Friesian and Black-Spotted Estonian cattle was carried out at the Noril'skiy, Dudinskiy and Kureyskiy sovkhozes. A large breed group of Black-Spotted cattle was developed. The animals of this group have an average live weight at the adult age of 550 kg., high milk productiveness (milk yield at the Noril'skiy sovkhoz in 1956 was 3,616 kg.), and are adapted to local conditions.

Card 1/1

USSR/Farm Animals. Cattle. Q

Abs Jour: Ref Zhur-Biol., No 17, 1958, 78682.

Author : Solotchin, I. D.
Inst :
Title : Dairy Cattle in the Extreme North.

Orig Pub: S. kh. Sibiri, 1957, No 12, 89-90.

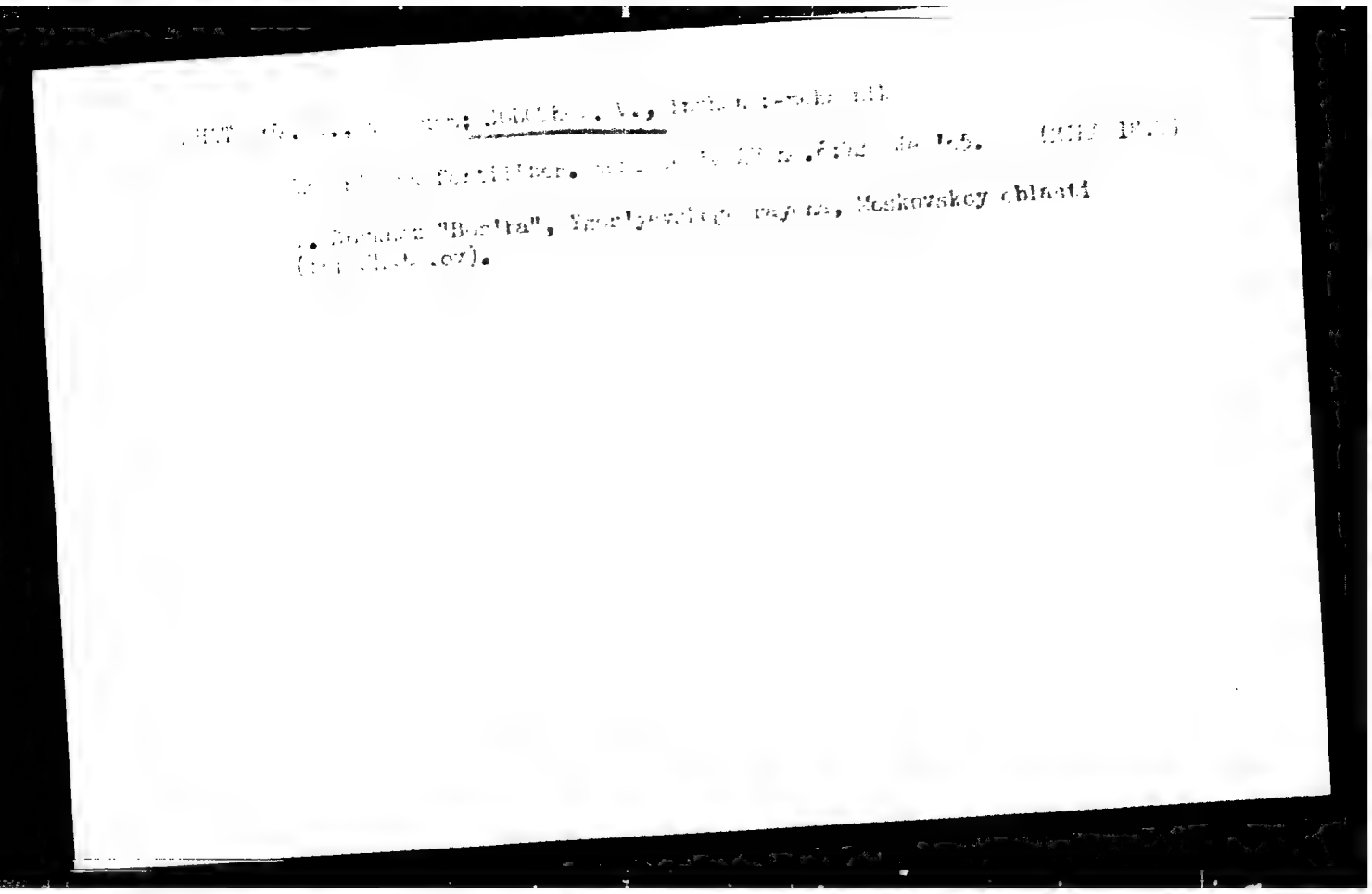
Abstract: As a result of complex alternative cross breeding of local Siberian, Yaroslavl, Kurgan, Simmenthal, Kholmogory, East Friesian and Black-Spotted Estonian cattle in the Dudin and Kurey sovkhozes, a numerous breed group was created of high-producing Black-Spotted cattle. The average live weight of cows is 550 kg; milk yield 3480-3714 kg.

Card : 1/1

SOLOTCHIN, I.D.

Effectiveness of ensilage type of feeding. Zhivotnovodstvo 20 no. 10:36-40 O '58. (MIRA 11:10)

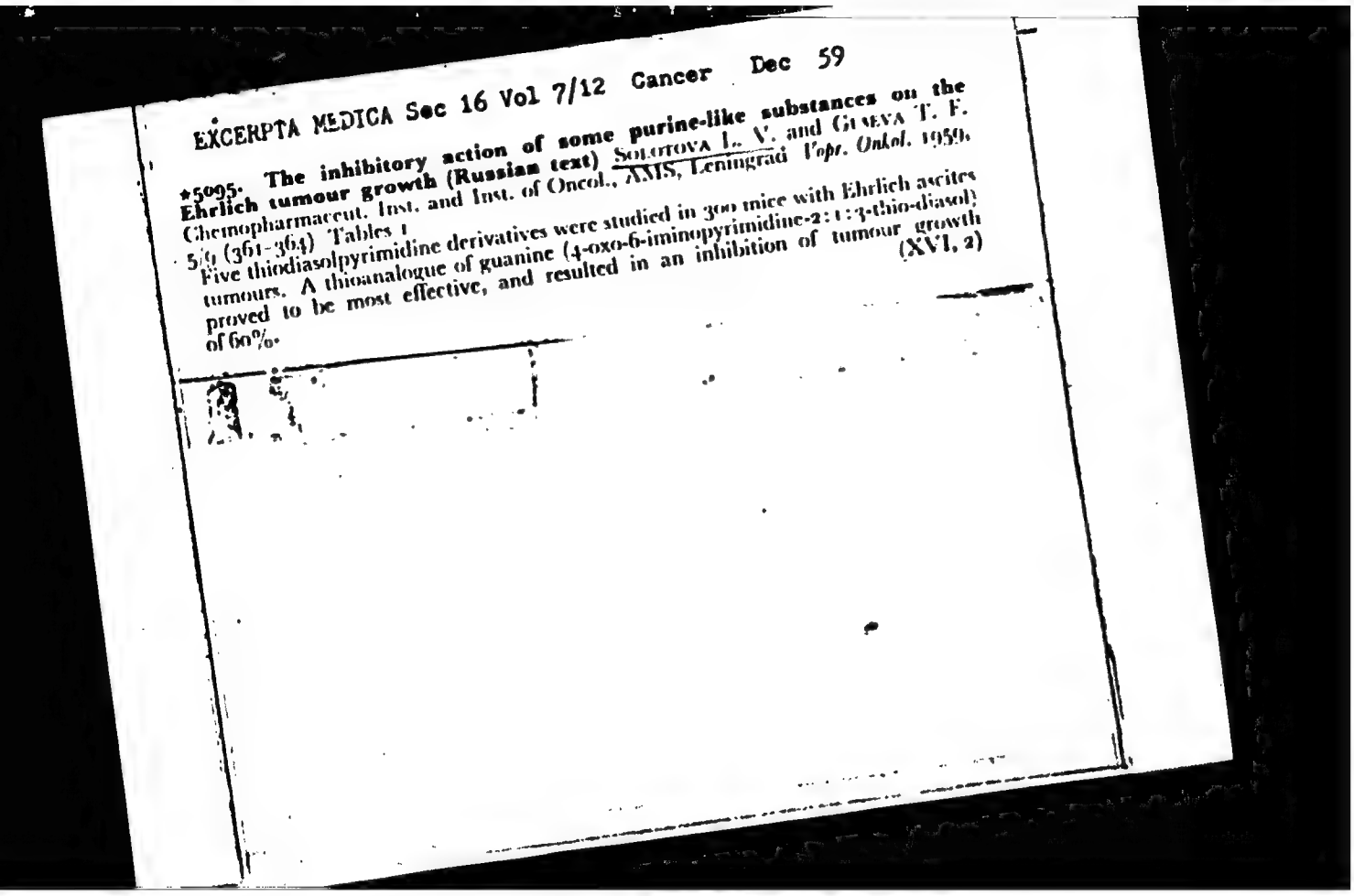
1. Zaveduyushchiy otdelom zhivotnovodstva Tyumenskoy gosudarstvennoy sel'skokhozyaystvennoy opytnoy stantsii.
(Ensilage)



SOLOTNITSKAYA, S. Ya.

Lyekarstvyennyye rastyeniya v Yeryevanskom botanich-yeskom saud. Byullyetyen' glav. botan. sada, vyp. 3, 1949, s. 57-59.

SO: LETOPIS' NO. 34



EXCERPTA MEDICA Sec 16 Vol 7/12 Cancer Dec 59

*5095. **The inhibitory action of some purine-like substances on the Ehrlich tumour growth (Russian text)** SOLNTSOVA I. V. and GUSEVA T. F. Chemopharmaceut. Inst. and Inst. of Oncol., AMS, Leningrad *Vopr. Onkol.* 1959, 5/6 (361–364) Tables 1

Five thiodiasolpyrimidine derivatives were studied in 300 mice with Ehrlich ascites tumours. A thioanalogue of guanine (4-oxo-6-iminopyrimidine-2:1:3-thio-diasol) proved to be most effective, and resulted in an inhibition of tumour growth of 60%. (XVI, 2)

MANSHILIN, V.V.; MANAKOV, N.Kh.; AGAFONOV, A.V.; VASILENKO, V.P.; MASLOV, I.Ya.; KNYAZEV, V.S.; Prinimali uchastiye: BELOUSOVA, I.V.; BEREZOVSKIY, V.D.; BOL'SHAKOVA, K.A.; YEMEL'YANOV, A.A.; ZEFIROVA, Ye.G.; NEMETS, L.L.; OKINSHEVICH, N.A.; RYABOV, V.M.; STEPANENKO, I.A.; STOLYARENKO, Ye.G.; SOLOTSINSKIY, S.Ye.; KHRAMOV, A.Ye.; CHELOGUZOVA, Ye.F.

Engineering development of a new system of catalytic cracking in a fluidized bed. Khim.i tekh.topl.i masel 7 no.6:41-50 Je '62. (MIRA 15:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut po pererabotke nefti i gazov i polucheniyu iskusstvennogo zhidkogo topliva.
(Cracking process)
(Fluidization)

MANSHILIN, V.V.; AGAFONOV, A.V.; MANAKOV, N.Kh.; VASILENKO, V.P.; MASLOV, I.Ya.; KNYAZEV, V.S.; STEPANENKO, I.A.; Prinimali uchastiye: VAYL', Yu.K.; NEMETS, L.L.; BELOUSOVA, I.V.; STOLYARENKO, Ye.G.; YEMEL'YANOV, A.A.; RYABOV, V.M.; BEREZOVSKIY, V.D.; ZEFIROVA, Ye.G.; CHELOGUZOVA, Ye.F.; SOLOTSINSKIY, S.Ye.; BOL'SHAKOVA, K.A.; KHRAMOV, A.Ye.

Catalytic cracking of raw heavy distillates on a microspheric catalyst of Troshkovskiy clay. Khim. i tekh. topl. i masel. 8 no.3:1-6 Mr '63. (MIRA 16:4)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut po pererabotke nefti i gazov i polucheniyu iskusstvennogo zhidkogo topliva. (Cracking process) (Catalysts)

SOLOTSKIY, I.; GIPP, V.

Tula. Na stroi.Ros. no.2:37 F '61. (MIRA 14:6)

1. Nachal'nik tekhnicheskogo otdela kombinata Uglemetallurgstoy (for Solotskiy).
(Tula District--Construction industry)

SOLOTYCH, B. N.

N/5
615.905
.S6

Physikalische Grundlagen Der Elektrofunkenbearbeitung Von Metallen. Berlin, Technik, 1955.

88 p. Illus., Diagrs., Tables. (Schriftenreihe Des Verlages Technik, Band 175)

Translation from the Russian; Fizicheskiye Osnovy Elektroiskovoy Obrabotki Metallov, (N.P., N.D.)

"Literaturverzeichnis": p. 86-88.

BASHENOVA, T. V. and SOLUKHIN, R. I.

"Gas Ignition behind the Shock Wave."

paper submitted at 7th International Symposium on Combustion, London/Oxford. 27 Aug - 3 Sep 58.

S/179/59/000/0[illegible]/[illegible]
E131/E152

AUTHOR: Soloukhin, R.I. (Novosibirsk)

TITLE: On the Propagation of Waves from a Rear Detonation

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniya tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1959, Nr [illegible], pp 145-146 (USSR)

ABSTRACT: The character of acoustic waves behind the front of detonation was investigated. The device used in experiments is illustrated in Fig 1, and a photograph showing the cross-section of a wave is reproduced in Fig 2. The propagation of waves in different media is illustrated in Fig 3. Fig 4 shows a relationship between the natural logarithm of the radius of propagation and the angle of trajectory given in Fig 3a. As can be seen from the graph, the equation of trajectory can be written as

$$\varphi - \varphi_1 = 0.7 \ln (r/r_1)$$

i.e. the trajectory can be represented as a logarithmic spiral

$$r(d\varphi/dt) = a.$$

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SOV/20-122-6-25/49

5(4)
AUTHORS: Zaytsev, S. G., Soloukhin, R. I.

TITLE: On the Problem of the Inflammation of an Adiabatically Heated Gas Mixture (K voprosu o vosplamenenii adiabaticheski nagretoy gazovoy smesi)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 6, pp 1039-1041 (USSR)

ABSTRACT: The present paper investigates the occurrence and development of an exothermic reaction in a homogeneous gaseous medium, which was adiabatically heated to temperatures of 600-1400° at pressures of 1 - 3 atm. Experiments were carried out by means of a shock tube. In the mixture under investigation, which was in a low-pressure chamber, a shock wave S was produced, which propagated along a channel and was normally reflected by the front surface of the chamber. The inflammation processes were investigated in oxygen-hydrogen mixtures. The schlieren photographs and the pressure recorded on the walls of the chamber indicate the following: The pressure and the density of the gas behind the shock wave are slightly disturbed. The amplitude of the pressure vibration amounts

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On the Problem of the Inflammation of an Adiabatically Heated Gas Mixture

to not more than 5 % of the absolute value. Density vibrations amount to not more than 0.5 % of the absolute value. However, the nature of these disturbances is in no connection with the specific properties of the chemically reacting gas mixture. The inflammation process in an adiabatically heated medium develops as follows: The visible reaction, which is accompanied by an intense radiation of light and by a sharp modification of the thermodynamic parameters of the gas mixture occurs first at one or several points of the investigated volume, i.e. the reaction centers. These inflammation centers spread gradually. The front of this inflammation center moves at a temperature of 900° with a velocity of 180-200 m/sec. After amalgamation of several centers of inflammation shock-like explosions take place in the space thus formed, and the velocity of motion of the front of the newly formed domain increases to ~2000 m/sec. A typical photograph illustrating this process is attached. The experimentally determined values of the delay of inflammation agree satisfactorily with the values calculated according to the chain reaction theory.

The authors thank A. S. Predvoditelev, Ye. V. Stupochenko and I. V. Bazhenova for their constant interest in this work

On the Problem of the Inflammation of an Adiabatically Heated Gas Mixture

as well as for valuable advice. There are 3 figures and 9 references, 6 of which are Soviet.

ASSOCIATION: Energeticheskiy institut im. G. M. Krzhizhanovskogo Akademii nauk SSSR
(Power Engineering Institute imeni G. M. Krzhizhanovskiy of the Academy of Sciences, USSR)

PRESENTED: June 11, 1958, by V. N. Kondrat'yev, Academician

SUBMITTED: June 11, 1958

Card 3/3

S/124/61/000/009/009/058
D234/D303

11.7700

AUTHOR: Soloukhin, R.I.

TITLE: Streams of gas during ignition behind the shock wave

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 9, 1961, 17, abstract 9 B88 (V sb. "Probl. energetiki", M., AN SSSR, 1959, 735-744)

TEXT: Combustion of gas behind a shock wave propagating in a combustible gas mixture was studied. Conditions are analyzed, under which the shock wave propagates in a stationary way. From the conditions of discontinuity and the equations of one-dimensional motion of gas it is concluded that the stationary motion can have two forms: 1) With constant gas parameters behind the shock wave (Chapman-Zhuge condition) [Abstracter's note: Second name translitterated] and 2) if there is a rarefaction wave behind the shock wave and the velocity of motion of the contact surface does not exceed the velocity of gas behind the detonation wave. The case of the

Card 1/3

S/124/61/000/009/009/058
D234/D303

Streams of gas...

velocity of motion of the contact surface being larger than that of gas (over-compressed waves) is theoretically possible, but spin detonation was observed instead in the experiments. The phenomenon of spin detonation is explained by instability of the over-compressed wave and appearance of oscillations in the gas. The experiments were carried out in a shock tube with square cross-section. Simultaneously with photographing the shock wave by Tepler's [Abstracter's note: Transliterated] method, pressure was recorded on a rotating film. Combustible mixtures consisting of H - O and CH_4 - O were utilized at initial pressure of 0.02 - 0.2 atm. Mechanism of development of the combustion process behind the shock wave (with M = 3-4) is described. The ignition occurred near the contact surface. As a result of combustion, compression waves were formed which joined and reinforced the primary shock wave and caused the transition to detonation. When the velocity of the shock wave exceeded the speed of detonation for a given combustible mixture, a phenomenon occurred which was analogous to spin detonation. For mixture of H with O the frequency of density and pressure variation

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Streams of gas...

behind the wave was 40 - 80 kc/s. Photographing through a stepped slit showed that there is a rotation of tangential antinode of oscillation pressure. Upon ignition of these mixtures by a heated wire, ordinary detonation without oscillation was observed. [Abstracter's note: Complete translation]

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10(2) PHASE I BOOK EXPLOITATION SOV/2162

Akademiya nauk SSSR. Energeticheskiy institut.

Fizicheskaya gazodinamika (Physical Gas Dynamics) Moscow, 1959. 167 p. 3,000 copies printed.

Resp. Ed.: A.S. Predvoditelev, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: R.I. Kosykh; Tech. Ed.: Ye. V. Makuni.

PURPOSE: This collection of articles is intended for scientific workers, instructors, engineers, and advanced vuz students specializing in the field of gas dynamics and the physics of combustion.

COVERAGE: This collection of articles is concerned with the results of work performed at the Power Institute, Academy of Sciences, USSR, during the years 1952-1955. Problems of gas dynamics and thermodynamic properties of air at high temperatures (up to 12,000° K) in a wide range of pressures from 0.001 to 1,000 atm. are discussed. Methods are presented for calculating a normal shock with consideration of the dissociation and ionization of air. Some of the papers of the collection deal with hydrodynamic phenomena associated with electric discharges in water. References follow most of the papers.

TABLE OF CONTENTS:

To investigate the possibility of using an underwater spark discharge as a source of pressure in water, a theoretical and experimental study was made of the laws of motion of the fluid and the distributions in time and space of the pressures caused by the discharge. The paper deals with the motion of a gas bubble formed by the discharge. The initial pressure of the discharge is calculated according to the law of expansion of the gas bubble. The pressure variations inside the bubble and in the surrounding medium are determined as functions of time. The calculated values of the pressure field are found to be in good agreement with the experimental data.

This paper deals with a photographic investigation of the formation of a shock wave resulting from an electrical discharge in water (one-dimensional case). It has a bearing on studies of underwater explosions. A brief description of the method and equipment used to photograph the discharge is given. By analyzing the photographs, a qualitative explanation is obtained of the process taking place during the discharge and the mechanism whereby a shock wave is formed. It is shown that the configuration of the rapidly expanding gas bubble may, in the one-dimensional case, lead to the formation of a shock wave from elementary disturbances. Experimental data are presented showing the variation of the velocity of the shock wave with distance from the spark. The corresponding pressures are calculated on the basis of data from underwater explosions.

This paper is an analytical study of the formation of shock waves in water, resulting from underwater explosions. It is assumed that a shock wave can be formed at a given distance from the source of the explosion by the superposition of elementary compression waves being propagated into the water from the boundary of an expanding gas bubble. The first part of the analysis derives the law of expansion of the gas bubble necessary for the formation of a shock wave at a given distance from the explosion. The second part calculates the amount of energy which must be imparted to the water by the expanding gas bubble as a function of time in order for the shock wave to form at a given point.

5 (4), 10 (7)

AUTHOR: Soloukhin, R. I. SOV/53-68-3-8/11

TITLE: Physical Investigations of Gases by Means of Shock Waves (Fizicheskiye issledovaniya gazov s pomoshch'yu udarnykh voln)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 3, pp 513-528 (USSR)

ABSTRACT: In laboratory practice, shock waves are frequently used for the investigation of the physical and physico-chemical properties of gases. The present paper gives a survey of experimental methods, their fields of application, and of the possibilities they offer. From among the abundance of possibilities of investigation, several characteristic cases are discussed. By means of shock waves it is possible not only to investigate thermodynamic states of equilibrium, but also nonequilibrium processes occurring during the heating of the gas in the shock wave. By means of this method it is possible to carry out measurements of the temperature, density, pressure, degree of ionization, emission- and absorption ability, electric conductivity, and other parameters of the gas within short intervals (10^{-5} - 10^{-4} sec). The author here deals with problems of the production of thermodynamic equilibrium behind the shock wave front in various gases only. With respect to the problem of strong shock waves and the inner

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structure of the shock wave front in consideration of radiation and heat transfer, reference is made to the survey given by Ya. B. Zel'dovich and Yu. P. Rayzer. Chapter 1 deals with the selection of the production method and with the use of shock waves. The method of the shock tube and the plate method are discussed. Figure 1 shows a characteristic recording (frequency 40000 frames/sec) of the propagation of the shock wave in CO_2 in the case of a quadratic cross section of the shock wave (striae method). Figure 2 for the same case shows an oscillogram of pressure behind the shock wave. The velocity of the shock wave is determined from the inclination of the first perturbation line, the upper temperature limit is given as amounting to 20000° K. Figure 3 shows a striae photograph of a shock wave reflected in argon. Chapter 2: The thermodynamic properties of air and other gases at high temperature. By making use of experimentally determined constants the thermodynamic equilibrium parameters of a number of gases may be determined behind the shock wave, as e.g. was shown by I. B. Rozhdestvenskiy for air up to T = 12000° K behind the shock wave; (see also

S. S. Semenov). Figure 4 shows the dependence of air temperature behind the plane shock wave on the velocity of the shock wave at various initial pressures before the shock wave. Figure 5 shows three diagrams of shock adiabatics, which were obtained when using explosives - for nitrogen (the lower line corresponds to the dissociation energy of 9.76 ev), - for argon and for air (the fully traced curves have been theoretically obtained for a perfect gas, the dotted one after calculation for a nitrogen dissociation energy of 9.76 ev). Chapter 3: Propagation of shock waves in a relaxing gas. The experiments carried out by A. Kantrowitz and some theoretical results obtained (plane shock waves) by Ya. B. Zel'dovich and S. P. D'yakov are discussed. Figure 6 shows the scheme of the impulse method of the photometrization of the intensity of light and a characteristic p(x)-curve. Chapter 4: The investigation of chemical reactions taking place in the gas behind the shock wave. For the purpose of investigating the kinetics of chemical reactions, the shock tube method is mainly used. Chemical reactions with positive thermal effect are discussed in detail - intense shock waves in gas mixtures cause an exothermal reaction, which leads to

combustion and thus to the propagation of a detonation wave; the spiral-shaped propagation of detonation waves (spin detonation) was explained by K. I. Shchelkin and Ya. B. Zel'dovich, and experimentally it was investigated by B. V. Voytsekhovskiy. In the following, the author investigates the kinetics of chemical reactions by means of shock waves. Chapter 5: Spectroscopic investigations of the gas state behind the shock wave (temperature determination according to N. N. Sobolev, spectroscopic investigation (Figs 14, 15), I. Sh. Model'. Thermal ionization of the gas). Chapter 6 finally gives a short account of the thermodynamic equilibrium in gas ionization behind the shock wave (figure 16 shows the experimental arrangement, and figure 17 a diagram of the ionization delay). There are 17 figures and 52 references, 21 of which are Soviet.

:0(1)
AUTHORS: Soloukhin, R. I., Topchiyan, M. Ye. SOV/20-127-4-11/60

TITLE: Investigation of the Spin Detonation Trail

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 772-773 (USSR)

ABSTRACT: The cause of the appearance of an intensely shining area in the inflammation of gases has not yet been fully clarified. For further clarification of this problem, the present paper investigates the area behind the front of the spin detonation. In this area, there is a luminescent disturbance, a trail spreading around the tube at a velocity higher than sonic velocity. Thus, the disturbance cannot be regarded as a sound wave or shock wave. To clarify the behavior of the trail, the change in velocity and frequency was measured in various parts along the trail. A mixture of CO and O_2 was used for the investigation.

The velocity of the trail observed was 1,735 m/sec. It was propagated over a few hundreds of cm. The velocity of the trail and the frequency of the trail rotation became much smaller when a cylinder with a smaller diameter was introduced into the interior of the tube. The variations of the above values found

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in many experiments are illustrated in the table. The analysis of the data obtained shows that the acoustic natural vibrations of the burning gas must be considered in the clarification of the peculiarities of the spin detonation. There are 1 figure, 1 table, and 7 references, 3 of which are Soviet.

ASSOCIATION: Moskovskiy fiziko-tekhnicheskiy institut
(Moscow Institute of Physics and Technology)

PRESENTED: April 15, 1959, by M. A. Lavrent'yev, Academician

SUBMITTED: April 1, 1959

PHASE I BOOK EXPLOITATION SOV/4913

Salamandra, Genriyetta Davydovna, Tat'yana Valerianovna Bazhenova, Sergey Grigor'yevich Zaytsev, Rem Ivanovich Soloukhin, Ideya Mikhaylovna Naboko, and Irina Konstantinovna Sevast'yanova.

Nekotoryye metody issledovaniya bystroprotekayushchikh protsessov i ikh primeneniye k izucheniyu formirovaniya detonatsionnoy volny (Some Research Methods for Transient Processes and Their Application to the Study of Detonation-Wave Development) Moscow, Izd-vo AN SSSR, 1960. 91 p. Errata slip inserted. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Energeticheskiy institut imeni G. M. Krzhizhanovskogo.

Resp. Ed.: A. S. Predvoditelev, Corresponding Member, Academy of Sciences USSR.; Ed. of Publishing House: Ya. A. Klimovitskiy; Tech. Ed.: V. Karpov.

PURPOSE: This book is intended for engineers and scientists engaged in developing research techniques and performing experimental

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With the aid of the investigation methods developed, a detailed study was undertaken of the mechanism of a detonation occurring during propagation of a flame in a tube and of supersonic flow of gas mixtures capable of reaction in a shock tube. The first chapter was written by G. D. Salamandra; in it a detailed review of various methods used to produce spark photographs of transient processes is given. Certain difficulties which had to be met in the course of the investigations are described and methods for surmounting them are demonstrated. The second chapter, written by S. G. Zaytsev, describes methods for measuring rapidly varying pressures, developed by the Power Engineering Institute of the Academy of Sciences USSR for investigation of the state of gas in shock tubes. The methods have found wide application. The third chapter presents the results of the investigations conducted with the aid of the methods discussed on the mechanism of the development and propagation of detonation waves under various hydrodynamic conditions. These investigations were recently completed at the laboratory for combustion physics by T. V. Bazhenovaya, G. D. Salamandra, R. I. Soloukhniy, S. G. Zaytsev, I. M. Naboko, and I. K. Sevost'yanovaya. Of particular interest

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AUTHOR: Soloukhin, R.I.

TITLE: Measuring pressure behind a detonation wave

SOURCE: Konferentsiya molodykh uchenykh. 5th.Trudy. v.2 Mosocw, AN SSSR. Energ. inst. 1960, 44-50

TEXT: The author reports measurements of pressure behind the wave-front of a detonation wave in a shock tube. The detonation waves were produced in a tube of square cross-section (4 x 4 cm) The high pressure section was filled with hydrogen (8-10 atm) and was separated by a cellophane partition from the low pressure section which was filled with the mixture under investigation (0.2 - 0.02 atm). The barium titanate pressure probe was capable of measuring the pressures to within - 0.0005 atm, i.e. to within 1-2% of the actual pressure. The resolution was such that for shock waves propagating with a velocity of 2000-3000 m/sec, the measured pressure was averaged over a period of

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Measuring pressure ...

3-5 μ sec. The appearance of the wave-front was photographed at the same time using the IAB-451 (IAB-451) apparatus. It was found that spinning structures were practically absent in stoichiometric mixtures of acetylene and oxygen. Subject to the finite resolution of the device, the maximum pressure behind detonation waves in acetylene were found to be in accordance with the Chapman-Jouget theory. There are 4 figures, 1 table and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: A. Mooradian, W.I. Gordon, Chem.Phys. 19,9 1166, 1951; G. Kistiakowsky, P.I. Mangelsdorf, Chem. Phys.

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SOLOUKHIN, R.I. (Novosibirsk)

Detonation of acetylene. PMTF no.1:18-20 My-Je '60. (MIRA 14:8)

1. Institut gidrodinamiki Sibirskogo otdeleniya AN SSSR.
(Acetylene) (Detonation)

28337 S/124/61/000/006/010/027
A005/A130

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AUTHORS: Soloukhin, R.I.; Topchiyan, M.Ye.

TITLE: Acoustic effects in spin detonations

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 6, 1961, 15, abstract 6 B 77. (V sb.: 3-ye Vses. soveshchaniye po teorii goreniya. T. 1. Moscow, 1960, 169 - 174)

TEXT: The present article repeats in simplified form the theoretical analysis of the spin detonation effect from the acoustic point of view that was more fully considered by Manson and Fay (Manson, N., Propagation des détonationset des déflagrations dans les mélanges gaseux. ONERA, Paris, 1947; Fay, J.A., J. Chem. Phys., 1952, v. 20, no. 6). The authors present the results of Toepler instantaneous and compensating photographing and recording by piezo-transmitter of the fluctuations in density and pressure of a burning gas in spin and pulsation detonations that can be excited in a shock pipe of rectangular cross section. Different conditions of initiating the detonation were realized by choosing initial conditions in the diaphragm of the high-pressure section in the shock pipe. The Toepler photographs showed regularly alternating excitations of the density of

...ure ...ren at var-
...tion was recorded by
...to the axis of the detonation
...detonation wave propagation. This test
...ue loop for a 200 + O_2 mixture does not de-

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SOLOUKHIN, R.I. (Novosibirsk)

Use of shock waves for studying the ignition of gas. PMTF no.2: 90-92 Jl-Ag 60. (MIRA 14:6)

1. Institut gidrodinamiki Sibirskogo otdeleniya AN SSSR.
(Shock waves) (Gas--Electric ignition)

KEDRINSKIY, V.K. (Novsibirsk); SOLOUKHIN, R.I. (Novosibirsk)

Compression of a spherical gas cavity by a shock wave in water.
PMTF no.1:27-29 Ja - F '61. (MIRA 14:6)

1. Institut gidrodinamiki Sibirskogo otdeleniya AN SSSR.
(Schock waves) (Cavitation) (Hydrodynamics)

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AUTHOR: Soloukhin, R. I.

TITLE: The Bubble Mechanism of the Shock Inflammation in a Liquid

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 2, pp. 311-312

TEXT: In earlier papers it has already been shown that an explosion in shock inflammation occurs all the more easily the more gas bubbles exist in the liquid. The author reports on experiments with shock inflammation of explosive gases, which were emulsed as bubbles in water. The shock wave was produced by means of a condenser discharge. The pressure was measured by means of a piezoelement, the discharges were photographed by means of a cinematographic camera. A differential equation for the description of the motion of a bubble wall under the action of external pressure is given, whose solutions show satisfactory agreement with the experiment. This differential equation reads:

$$\rho\left\{r\frac{d^2r}{dt^2}+\frac{3}{2}\left(\frac{dr}{dt}\right)^2\right\} = p_\infty(t) - p_0\left(\frac{r_0}{r}\right)^{3\gamma},$$

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AUTHOR: Soloukhin, R. I.

TITLE: Piezo pick-up for recording pressures

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.3, pp.170-171

TEXT: In pick-ups currently used for measuring shock-wave pressures, the resolution power according to time can be improved by reducing the dimensions of the piezo element. However, this leads to a decrease in the sensitivity and requires a special technology for manufacturing pick-ups. In this paper a description is given of the design and the principle of operation of a piezo element of a relatively large size (over 1 cm) which is suitable for recording rapid pressure changes behind the shock-wave front reflected from the wall. A sketch of the pick-up is shown in Fig.1 (1 - piezo element, 2 - zinc rod, 3 - wall of the shock tube channel, 4 - front of the shock-wave). The receiving surface of the cylindrical 13 mm diameter 11 mm high piezo element forms a part of the reflecting wall which closes the channel of the shock tube. The acoustic impedance of the barium titanate of which the piezo element is made approaches the value of the

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impedance of zinc. Therefore, the piezo element is soldered by means of Wood alloy to a long zinc rod of the same diameter so as to exclude reflection of the elastic wave from the frontal areas. The space between the receiving equipment and the body of the instrument is filled with beeswax to eliminate recording of the oscillations of the body of the pick-up. The charge generated by the piezo element is determined by solving the equation of the propagation of the elastic wave in a semi-infinite rod with the boundary force p(t):

$$q(t) = (eSC/E)\int_0^t p(t)dt \quad (0 < t < h/C),$$

where C - speed of sound in the piezo element, E - modulus of elasticity, e - piezo modulus, S - area of the receiving surface, h - height of the piezo element rod. Thus, the sought dependence p(t) is obtained by differentiating the signal according to time. Verification of the operation of the pick-up and its calibration is by means of shock and detonation waves produced in the tube. The pressure behind the shock-wave front in an inert gas is constant and, therefore, the charge will show a linear increase with time. In the case of a detonation wave, the existence of a narrow range

of chemical transformation near the front, with a pressure almost twice the pressure in the burning gas, is a characteristic feature. If the unidimensional structure of the detonation wave is conserved, stable recording of the region of increased pressure is possible. In Fig.2, showing the pressure behind a detonation wave (p, atm vs. t, μsec), the dotted line curve is the pressure oscillogram used in the calculations and obtained for the detonation wave propagating in a mixture of acetylene with oxygen in the case of an initial pressure of 0.04 atm. Changes in the steepness of the curve at the initial section of the signal corresponds to the transition from the higher pressure amplitudes to the lower ones. The dependence of the pressure on time, determined from this oscillogram, is given by the full line curve in Fig.2; t_1 designates the time of passage of the compression wave throughout the entire length of the piezo element. An increase in the signal for the time $t > t_1$ is caused by the reflection of the elastic wave from the soldered spot. In the method described, the resolution power according to time is determined basically by the accuracy of the parallelism of the front of the shock-wave and the surface of the piezo element, i.e. it can be less than 0.4 μsec. Furthermore, the

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AUTHOR: Soloukhin, R.I. (Novosibirsk)

TITLE: Transition from burning to detonation in gases

PERIODICAL: Akademii nauk SSSR. Sibirskoye otdeleniye. Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki. no.4, 1961, 128-132

TEXT: It is pointed out that existing theories of formation of detonation waves (Ref.1: Salamandra G.D., Bazhenova T.V., Zaytsev S.G., Soloukhin R.I., Naboko I.M., Sevast'yanova I.K. Some methods for studying fast processes, Izd-vo AN SSSR, 1960; Ref 2: Babkin V.S., Kozachenko L.S. PMTF, 1960, No.3; Ref.3: Taylor G.J., Tankin R.S. Gas dynamical aspects of detonation. Fundaments of gas dynamics, Princeton, 1958) are concerned with the elucidation of the conditions for the simultaneous existence of two discontinuities, namely, the shock wave and the burning front, through their interactior and coalescence. The present author reports some experiments which were designed to throw light on the process of formation of a detonation wave. A study was made of acetylene-oxygen mixtures (equal initial volumes) in the

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Transition from burning to ... S/207/61/000/004/005/012
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initial pressure range 50-200 mm Hg. Schieleren photographs and piezoelectric pressure records were obtained and some of them are reproduced in the present paper. Examination of these records shows that the detonation wave is produced as a result of the explosive ignition of one or several parts of the mixture in the region of burning. The author puts forward the following mechanism for such explosions. As a result of the distortion of the shape of the flame, isolated regions of the unburned mixture are partly or completely surrounded by the flame. Additional heating of the gas due to local compression may lead to explosive self-ignition. The appearance of local "explosions" and detonation can be observed both before and after the burning region reaches the compression wave front. In the present experiments the compression-wave flame combination was usually observed for lowered initial pressures of the mixture. The velocity of this type of wave is about 1000 m/sec and the calculated temperature of the compressed gas is less than 750°K. Experiments were also carried out to determine the point of inception of the explosions in a tube with glass viewing windows at the ends. It was found

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AUTHOR: Soloukhin, R.I. (Novosibirsk)

TITLE: Oscillatory burning of gas behind the shock wave in a supersonic flow

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1961, 57 - 60

TEXT: Investigation of a stationary detonation in a supersonic tunnel encounters the difficulty in mixing the fuel with the oxidizer, without previous ignition. The author solves the difficulty by using the method of pulsating combustion. The apparatus is shown schematically in Fig. 1. A supersonic stream of the mixture of short duration emerges from 1, and impinges on the cylind[illegible]3. A shock wave fo[illegible]ed on the surface of the cylinder ignites the gas. The pressure is registered by a pulse oscillograph with the aid of a piezo-transmitter of boron tit[illegible]ate. The impulse synchronizes a stroboscopic lamp of a frequency 30,000 flashes/sec. and schlieren-photographs are taken. After ignition, the shock wave, reinforced by burning, moves against the flow, but the detonation wave is ex-

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Oscillatory burning of gas ...

tinguished before reaching 1, owing to expansion of the shock-wave which is then pushed back to the cylinder, causing the second ignition etc. The process is terminated by the injection of "cold" gas. It was found that the period of oscillation was inversely proportional to the radius of the braking cylinder. The data were obtained for the ethyl alcohol-air-oxygen mixture and it was noted that similar periodic burning could be obtained by varying the concentrations of the components. There are 7 figures and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: R.A. Gross, Research on Supersonic Combustion Journ. A.R.S. 1959, v. 29, no. 1.

SUBMITTED: June 14, 1961

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S/207/62/000/002/006/015
D237/D302

AUTHORS: Solouukhin, R. I. and Sharanova, T. A. (Novosibirsk)

TITLE: Spectroscopic investigation of the state of gas behind the detonation front

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 2, 1962, 37-41

TEXT: Distribution of luminosity and temperature of the gas behind the detonation front in acetylene-oxygen mixtures, was investigated. Relatively high emission intensity of the gas in carbon lines made a spectroscopic determination of the temperature possible. Using a monochromator УМ-2 (UM-2), photomultipliers ФЭУ-19 (FEU-19) and a double beam oscillograph ОК-17М (OK-17M), the authors obtained the time resolution of 0.5×10^{-7} sec, which made measurements near the detonation front possible. The region of $\lambda =$ 5150 Å was used for temperature determination, while the spectral distribution of luminosity was obtained over the range of 4200 -

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5600 Å at intervals of 30 - 80 Å. A narrow zone was detected directly behind the front in which intense emission due to C_2 particles occurred, caused by their deviation from the equilibrium concentration in the region of chemical reaction. The experiments were performed at pressures of 25 mmHg, slit width 0.04 - 1 mm and the maximum temperature of the detonation $T_D K^o$ was presented in tabulated form, for the following mixtures: $C_2H_2 + O_2$ $C_2H_2 + 1.5O_2$, $C_2H_2 + 2O_2$, $C_2H_2 + 2.5O_2$, $C_2H_2 + 3O_2$. There are 7 figures and 9 references: 4 Soviet-bloc and 5 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: A. Gaydon and A. Fairbairn, Proc. Roy. Soc., 1957, A239, 1219, 484; G. Kistiakowsky, H. Knight and M. Malin, J. Chem. Phys., 1952, v. 20, no. 5, p. 884; G. Kistiakowsky and W. Zinman, J. Chem. Phys., 1955, v. 23, no. 10, p. 1889; C. Eisen, R. Gross and T. Rivlin, Combustion and Flame, 1960, v. 4, no. 2, p. 137.

SUBMITTED: October 30, 1961

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SOLOUKHIN, R.I.

High Speed Processes in Shockwaves.

The following dissertations were defended in the Joint Scientific Council of Physicomathematical and Technical Sciences; Siberian Branch
Doctor of Physicomathematical, 1962

Vestnik Akad Nauk, No., 4, 1963 pp. 119-145

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ASD/RPL/SSD Paa-4/Pd-4/Pr-4/Ps-4/Pt-4 WW/JW
ACCESSION NR: AP3006121 S/0207/63/000/004/0040/0047

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AUTHOR: Soloukhin, R. I. (Novosibirsk)

TITLE: Shock-wave refraction on a flame front

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1963, 40-47

TOPIC TAGS: shock wave, flame, pressure wave, shock flame interaction, combustion, detonation, deflagration, deflagration detonation transition, hydrogen, oxygen, burning rate, shock, flame deformation

ABSTRACT: As part of a comprehensive analysis of vibrational processes taking place during instable combustion, a study of shock wave—flame front interaction has been made to determine the conditions leading to shock-wave intensification and burning-rate increase. In previous Soviet theoretical and experimental studies, the intensification of compression waves by passage through a flame front was associated with either relaxational frontal interaction or equilibrium intensification of the refracted wave. In both cases pressure-wave intensification was explained as resulting from a burning-rate increase caused by the higher temperature of the gas, which is heated by the compression wave. No allowance was made in these studies for deformation of the flame surface. An approximate

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theoretical evaluation of flame-surface deformation in hydrogen-oxygen flames showed that a shock wave with a pressure difference $\Delta p = 0.1\ p_1$ (where p_1 is the pressure in the unburned gas) may cause a pronounced deformation by which the flame surface increases several times. The intensification of the shock wave due to flame deformation is considerably stronger than that caused by the increase in normal burning rate. To study the effect of flame deformation on shock-wave intensification, experiments with hydrogen-oxygen and acetylene-oxygen mixtures were made in a shock tube of 50 x 50 mm cross section. The mixture was spark-ignited at the closed end, and the collision of the incident and reflected shock wave with the laminar flame was scanned by time-resolved Schlieren photography and oscillographic pressure recordings. Special experiments were also made with variable ignition delays to study interaction with the collision point located at variable distances from the ignition point. The results showed that the pressure decreased behind the incident shock wave and increased proportionally to the distance from the ignition point behind the reflected wave (after the second passage through the flame front). The overall results of the study demonstrate that flame deformation is the major factor responsible for shock-wave intensification. On the basis of the photographs obtained, a mechanism of the transition from deflagration to detonation is outlined. It is also shown that self-ignition behind the reflected shock wave takes place when $\Delta p/p_1$ is

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ACCESSION NR: AP3006121

larger than 1.6. This pressure increase corresponds to a gas temperature of 770K, which is close to the ignition temperature of a stoichiometric hydrogen-oxygen mixture (800K). It is emphasized that the detonation wave is formed in the compressed gas between the shock front and the flame, rather than by coalescence of the shock wave with the flame as is usually assumed. "In conclusion, I express my gratitude to G. A. Zavarzin for his help in conducting the experiments." Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 12Mar63 DATE ACQ: 11Sep63 ENCL: 00

SUB CODE: AS, PR NO REF SOV: 011 OTHER: 002

Card 3/3

SOLOUKHIN, R.I. (Novosibirsk)

Some data on the nonequilibrium state of carbon dioxide behind the shock wave front. PMTF no. 6:138-140 N-D '63. (MIRA 17:7)

L 20243-63 EPA/EPR/EPF(c)/EWT(m)/BDS/ES(s) AEDC/AFFTC/APGC/SSD Ps-4/
Pas-4/Pr-4/Pt-4 EW/WW/JW/JWD/H
ACCESSION NR: AP3006792 S/0053/63/080/004/0525/0551

AUTHOR: Soloukhin, R. I.

TITLE: Detonation waves in gases

SOURCE: Uspekhi fizicheskikh nauk, v. 80, no. 4, 1963, 525-551

TOPIS TAGS: detonation, gas, gas detonation, detonation wave, gas ignition, ignition, deflagration, deflagration to detonation transition, self-ignition, flame shock interaction, stationary detonation wave, pulsating combustion, combustion, supersonic flow, spinning detonation, flame front, oscillatory combustion

ABSTRACT: This review of 125 articles (88 Soviet) published in 1959-1963 on detonation waves in gases deals with the following subjects: 1) Experimental methods for studying gas parameters behind a detonation front (pressure measurements by piezoelectric impulse pickups, measurement of gas density by Schlieren photography and interfermometry, temperature measurement by spectral line reversal, determination of chemical composition and component concentration). 2) Characteristics of gas ignition behind a shock wave (induction periods,

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kinetic reaction parameters). 3) Transition from deflagration to detonation in gases (gasdynamic mechanism describing the formation of detonations in tubes, composition of the gas mixture before the flame front, compression waves and adiabatic self-ignition, flame interaction with shock waves). 4) Gas pulsations behind the detonation front (causes of pulsating combustion, properties of trasverse waves, acoustic theory of spinning detonation, structure of spinning detonation waves). 5) Detonations in steady gas flow (gas combustion behind a stationary shock wave, stationary spinning detonation wave, pulsating combustion behind a shock wave in supersonic flow). It is emphasized that Western review articles in this field do not fully cover the contribution of Soviet scientists. Unsolved problems and prospective research are briefly discussed. Orig. art. has: 23 figures.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 30Sep63 ENCL: 00

SUB CODE: PR, AS NO REF SOV: 088 OTHER: 037

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VOYTSEKHOVSKY, B. V.; MITROFANOV, V. V.; SOLOUKHIN, R. I.; TOPCHIYAN, M. Ye.
(Novosibirsk)

"Some results of investigations on gas detonation"

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 1964.

VOYEVODSKIY, V. V. ; SOLUKHIN, R. I.

"On the mechanism and explosion limits of hydrogen and oxygen chain self-ignition in shock waves."

report submitted to 10th Intl Symp on Combustion, Cambridge, UK, 17-21 Aug 64.

Novosibirsk Univ.

VOYEVODSKIY, V. V.; SOLOUKHIN, R. I.

"On the mechanism and explosion limits of hydrogen and oxygen chain self-ignition in shock waves."

report presented at the 10th Intl Combustion Symp, Cambridge, UK, 17-21 Aug 64.

Novosibirsk Univ.

L 8449-65 EPA/EWT(l)/EPA(b)/EPA(e)-2/EWT(m)/EPF(c)/EPR/FCS(f)/FCS(k)/EWA(h)
Pd-4/Pr-4/Ps-4/Pt-10/P1-4 ASD(f)/AEDC(a)/ASD(d)/AEDC(b) WW/JW
ACCESSION NR: AP4044719 S/0207/64/000/004/0042/0048

AUTHOR: Soloukhin, R. I. (Novosibirsk)

TITLE: Detonation in a gas heated by a shock wave

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1964, 42-48

TOPIC TAGS: detonation initiation, reflected shock wave, gas detonation, slow burning, nonsteady flow, wave pattern, spontaneous combustion, adiabatically heated gas

ABSTRACT: Analysis of a number of phenomena accompanying gas detonation has indicated the need for a special study of the properties of detonation waves in a gas previously heated to 600—1800K, and particularly of the transition from slow burning to detonation. A new photographic technique, strip-film schlieren interferometry, was used to determine simultaneously the shock-wave pattern and the condensed-gas detonation in a nonsteady expansion of the combustion products. The close agreement between the theoretical and experimental results shows that in this case the detonation is initiated as a

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L 23917-65 EWT(1)/EWP(m)/FCS(k)/EWA(h) Pd-1/Pi-4

ACCESSION NR: AP5002875 S/0207/64/000/005/0138/0140

AUTHORS: Vorotnikova, M. I. (Novosibirsk); Soloukhin, R. I. (Novosibirsk)

TITLE: On flow structure in electric discharge shock tubes

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1964, 138-140

TOPIC TAGS: shock tube, electric discharge, shock wave, thermal plasma, nonequilibrium gas flow / FEU photomultiplier

ABSTRACT: Pressure measurement techniques, using piezoelectric counters and other probe methods, are compared with optical charts to determine the state of a gas behind shock waves generated in electric discharge shock tubes in order to determine more accurately departures from homogeneity. The discharge takes place in air at 0.2 mm Hg pressure. The results of pressure measurement and photomultiplier records on the oscillograph agree to within 0.1 μsec. A plot of absolute pressure versus shock velocity behind the shock waves shows measured values to be 50% lower than calculated values. This discrepancy is attributed primarily to experimental errors and possible nonequilibrium effects in the nonthermal plasma. Furthermore, a plot of reflected shock wave speed D' versus incident

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ACCESSION NR: AP5002875

wave speed D shows that experimental points are 1.2-1.5 times higher than the values obtained from one-dimensional equilibrium calculations. If, in the relationship $D' = v/(\beta - 1)$, the compressibility $\beta_2' \approx 5.0$, the experimental data will agree with calculated values. Measurements were made on shock stand-off distance over a cylindrical obstacle placed inside the shock tube. Once more a discrepancy was observed between calculated and measured Mach number values, indicating the absence of a clear demarcation between thermal and discharge plasmas in electromagnetic shock tubes at pressure levels below 1 mm mercury.
"The authors are grateful to B. V. Boshenyatov for his help in the experiments."
Orig. art. has: 8 figures.

ASSOCIATION: none

SUBMITTED: 02Jul64 ENCL: 00 SUB CODE: ME

NO REF SOV: 002 OTHER: 006

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SOLOUKHIN, R.I., doktor fiz.-matem. nauk

Symposium on combustion. Vest. AN SSSR 34 no.12:68 D '64
(MIRA 18:1)

L 55962-65 EWG(j)/EWT(l)/EWP(m)/EWT(m)/EPF(c)/EWA(d)/EPR/EWP(t)/FCS(k)/EWP(b)/EWA(h)/EWA(c) Pd-1/Pr-4/Ps-4/Pi-4 IJP(c) JD/WW

ACCESSION NR: AP4019983 UR/0020/64/154/006/1425/1428

AUTHORS: Voyevodskiy, V. V. (Corresponding member); Soloukhin, R. I. (Corresponding member)

TITLE: On the mechanism and limits of chain spontaneous ignition of hydrogen with oxygen in shock waves

SOURCE: AN SSSR. Doklady, v. 154, no. 6, 1964, 1425-1428, insert facing p. 1415

TOPIC TAGS: shock wave flame interaction, shock wave, shock wave front, shock wave motion, shock tube, shock flame

ABSTRACT: The work of P. I. Soloukhin (Udarnyye volny i detonatsiya v gazakh, M., 1963) indicated that a distinct change in the nature of combustion is observed in certain gas systems compressed by shock waves. The change occurs with the lowering of temperature through a defined region. Some indication of this change is given in the typical Schlieren photographs and in pressure and luminescence oscillograms shown in Fig. 1 on the Enclosure. One combustion center is observed at high temperatures. At lower temperatures the reaction spreads to many points, and combustion centers grow freely, so that a flame front is formed without a sharply defined explosive spontaneous ignition. It was discovered

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ACCESSION NR: AP4019983

that the temperature of transition from one type of detonation to another in a mixture of hydrogen and oxygen decreases with decreasing pressure. Furthermore, the boundary dividing the two regions in the pressure-temperature (p,T) plane corresponds closely to the theoretical curve obtained through extrapolating the so-called upper ignition limit of hydrogen with oxygen to the test conditions. The temperature and pressure boundaries of the "chain" combustion are shown in Fig. 2 on the Enclosure. The authors describe the combustion process as a sequence of seven occurrences. A discussion of the rate of combustion is presented. A formula based upon temperature and pressure parameters is given for calculating reaction speed. The use of the combustion rate computational method is compared graphically with test data. The results established qualitatively that the combustion rate deviates markedly in the temperature interval between the p_2 and p_3 curves in Fig. 2. The authors hypothesize that the delay is related to the concentration of O_2 molecules. Certain modifications to shock tube configuration are described. It is concluded that the observed delay effect is not the result of wall contact conditions in the shock tube. Orig. art. has: 10 equations and 3 figures.

ASSOCIATION: Institut gidrodinamiki Sibirskogo otdeleniya AN SSSR (Institute of Hydrodynamics, Siberian Branch, AN SSSR); Institut khimicheskoy kinetiki i

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L 55962-65
ACCESSION NR: AP4019983

goreniya Sibirskogo otdeleniya AN SSSR (Institute of Chemical Kinetics and Combustion, Siberian Branch, AN SSSR)

SUBMITTED: 04Oct63 ENCL: 02 SUB CODE: ME,

NO REF SOV: 004 OTHER: 001

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L 21078-65 EWT(l)/SWP(m)/EWT(m)/EPF(c)/FCS(k)/EWA(h) Pd-1/Pr-4/Pi-4
SSD(b)/SSD/ASD(a)-5/AEDC(b)/AFWL/AFETR/APGC(g)/ESD(ge)/ESD(t) RM

ACCESSION NR: AP5001506 S/0020/64/159/005/1003/1006

AUTHORS: Mitrofanov, V. V.; Soloukhin, R. I. B

TITLE: On the diffraction of a multiple-front detonation wave

SOURCE: AN SSSR. Doklady, v. 159, no. 5, 1964, 1003-1006

TOPIC TAGS: wave diffraction, detonation wave, multiple front wave, Schlieren photography, wave front curvature

ABSTRACT: The authors describe experiments which clarify some peculiarities of the emergence of the detonation wave from a channel of constant cross section into the volume of a gas under conditions when the detonation has a clearly pronounced multi-front character. The experiments were performed with a $C_2H_2 + O_2$ mixture at different initial pressures, and the positions of the diffraction front during succeeding instants of time were obtained by the Schlieren method.

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ACCESSION NR: AP5001506

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Since the occurrence of diffraction of detonation waves in gases is essentially connected with the existence of transverse waves, the authors examine the conditions for the attenuation and intensification of the transverse waves and their relation with the stability of the flame front of the gas propagating in the channel. The hypothesis is advanced that a decisive critical quantity for the generation of new transverse waves may be the radius of curvature of the front or its ratio to some characteristic length which characterizes the reaction zone behind the front. The minimum number of transverse waves necessary for the detonation to resume after emergence from the channel is found to be on the order of 10. This report was presented by M. A. Lavrent'yev. Orig. art. has: 4 figures and 1 formula.

ASSOCIATION: Institut gidrodinamiki sibirskogo otdeleniya Akademii nauk SSSR (Institute of Hydrodynamics, Siberian Department, Academy of Sciences SSSR)

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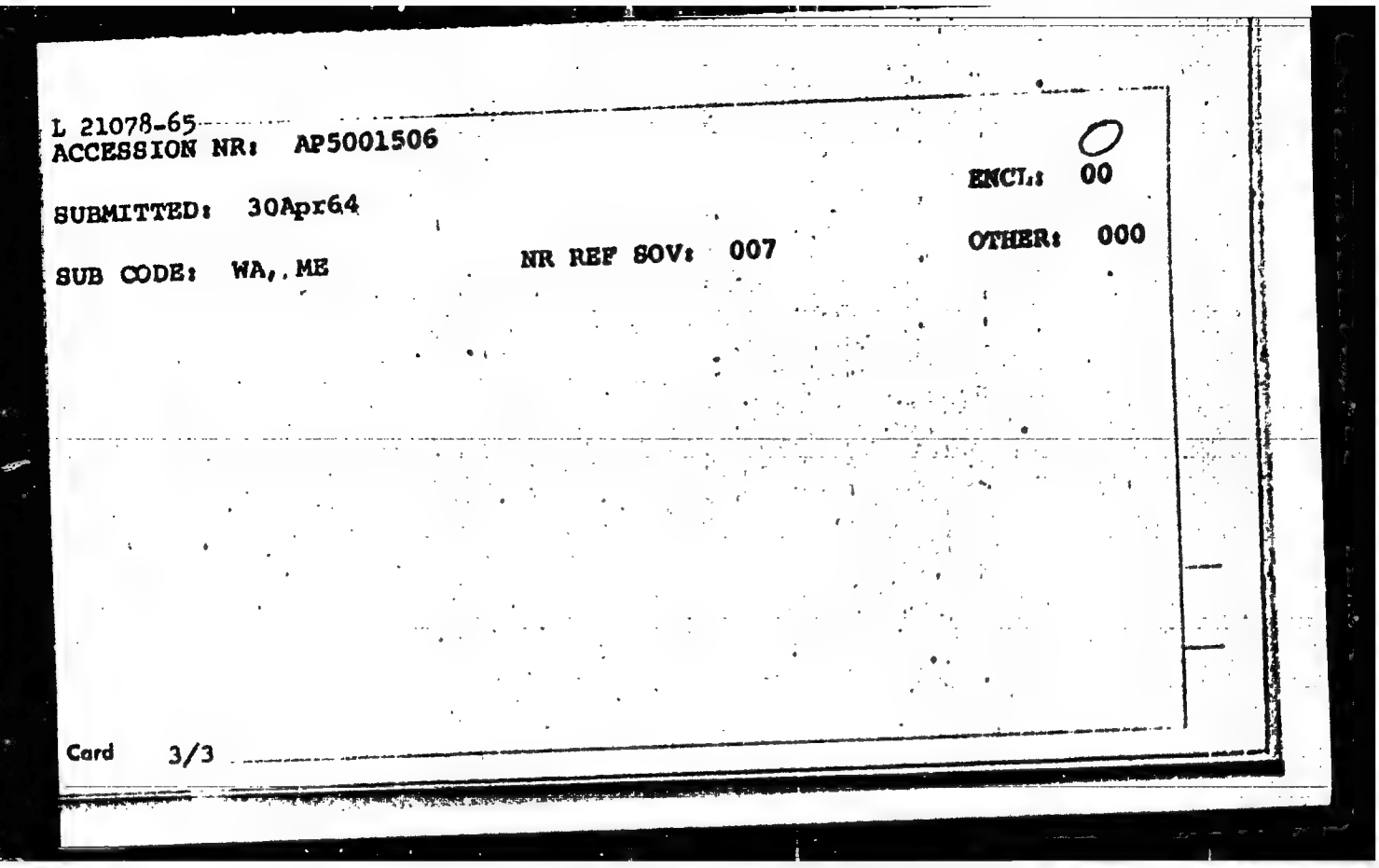

L 21078-65
ACCESSION NR: AP5001506

ENCL: 00

SUBMITTED: 30Apr64

SUB CODE: WA,.ME NR REF SOV: 007 OTHER: 000

Card 3/3

ZOROTNIKOVA, M.I. (Novosibirsk); KEDRINSKIY, V.K. (Novosibirsk); SOLOUKHIN, R.I. (Novosibirsk)

Shock tube for studying one-dimensional waves in fluids. Nauch.-tekh. probl. gor. i vzryva no.1:5-14 '65. (MIRA 18:9)

SOLOUKHIN, R.I. (Novosibirsk)

The Schlieren method for measuring the compression shock in a shock wave. Nauch.-tekh. probl. gor. i vzryva no.1:112-114 '65. (MIRA 18:9)

L 6421-66 EPA/EWT(1)/EWP(m)/EWT(m)/EPF(c)/EWP(f)/EWA(d)/EWP(j)/T/FCS(k)/EWA(h)/EWA(c)
ACC NR: AP5026064 ETC(m)/EWA(1) SOURCE CODE: UR/0405/65/000/002/0035/0042
WW/JW/WE/RM
AUTHOR: Soloukhin, R. I. (Novosibirsk)

ORG: None

TITLE: The structure of the multifront detonation wave in gases

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 2, 1965, 35-42

TOPIC TAGS: combustion, gas dynamics, shock wave analysis, shock wave structure, detonation kinetics, detonation wave.

ABSTRACT: The present paper describes the results of complex investigations of multifront detonation waves in gases. Data were collected by measuring in $C_2H_2 + 2.5O_2$ mixtures the pressure, density, temperature, and luminosity within the front with a time resolution of less than 0.5 μ sec (about 1 mm). The results obtained and a comparison with kinetic data indicate that the combustion of gases behind the detonation shock front remains essentially multidimensional, and the zone of chemical transformations appears, because of hydrodynamical effects, by one order of magnitude wider than the expected unidimensional reaction zone. The author thanks S. Toktomyshev, Yu. N. Berdyuk, and G. A. Zavarzin who participated in the experiments. The author also thanks E. V. Kruglyakov for useful advice concerning the methods of interferometric registration. Orig. art. has: 9 figures and 1 table.

UDC: 532.593+534.222.2

SUB CODE: ME,WA / SUBM DATE: 08Mar65 / ORIG REF: 007 / OTH REF: 005

Card 1/1

L 5393-66 EPA/ETC(m)/ENP(f) WW

ACC NR: AP5027282 SOURCE CODE: UR/0207/65/000/005/0124/0126

AUTHOR: Soloukhin, R. I. (Novosibirsk); Toktomyshev, S. Zh. (Novosibirsk)

ORG: none

qwl

51
B

TITLE: Temperature measurements behind a detonation front in gases

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1965, 124-126

TOPIC TAGS: detonation, combustion, propulsion, measurement method

ABSTRACT: Temperature measurements by this method are based on photometry of two hydrogen lines (H_β and H_γ). The spectrograph used (ISP-51) had a resolution $\Delta\lambda \approx 2$ Å. This method has several advantages. There are no errors from color temperature measurements of the comparison source. Most of the chemical reactions of practical interest involve hydrogen atoms. The relaxation times of atomic hydrogen are small, permitting inertialess recording of thermal changes with time. Transitions in the Balmer series for hydrogen can be calculated with sufficient accuracy. The gas temperature is calculated from the following equation:

$$T = \frac{E_2 - E_1}{2{,}3k}\left(\lg\frac{I_1}{I_2} - \lg\frac{\lambda_2}{\lambda_1}\frac{g_1}{g_2}\frac{A_1}{A_2}\right)^{-1}$$

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ACC NR: AP5027282

where E_i (in ev) is the energy of the upper level, I_i is the line intensity determined from the luminous flux (~ 2 Å), g_i is the statistical weight of the level, A_i is the probability of the transition. Accordingly

$$\delta T = \delta x \frac{kT}{E_1 - E_1} \qquad \left(x = \frac{I_1}{I_2},\ \delta x = \frac{\Delta x}{x},\ \delta T = \frac{\Delta T}{T}\right).$$

Control experiments showed that $\delta x \leq 3\%$. Consequently $\delta x \approx 2\%$, i.e., $\Delta T \sim 80C$ when $\Delta E = 0.5$ ev and $T \leq 4000K$. Measurements of the temperature behind the detonation front in acetylene-oxygen mixtures show good agreement with calculated values. This method appears suitable for inertialess measurements between 4000 and 5000K, with an accuracy of 2% of the measured magnitude and < 0.5 μsec lag. Comparison with gas-pressure data and evaluation of blackbody emissivity of the combustion products are given. Orig. art. has: 4 figures and 2 formulas. [VS]

SUB CODE: FP/ SUBM DATE: 20Mar65/ ORIG REF: 003/ OTH REF: 003/ ATD PRESS: 4137

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L 54611-65 EWT(1)/EWP(m)/EWT(h)/EPF(c)/EWA(d)/EPR/EWP(j)/FCS(k)/EWA(h)/
EWA(c) Pc-4/Pd-1/Pr-4/Pi-4 WW/RM

ACCESSION NR: AP5011536 UR/0020/65/161/005/1118/1120

AUTHOR: Voyevodskiy, V. V. (Academician); Soloukhin, R. I.

TITLE: The mechanism of high-temperature oxidation of methane in shock waves

SOURCE: AN SSSR. Doklady, v. 161, no. 5, 1965, 1118-1120, and insert facing p. 1118

TOPIC TAGS: combustion, ignition, methane oxygen mixture, gas combustion, ignition delay, shock wave, combustion mechanism

ABSTRACT: Previous studies examined the auto-ignition of hydrogen-oxygen mixtures in shock waves. Ignition-delay dependence on temperature showed the existence of a "leading" reaction at higher temperatures and of a limit at lower temperatures, connected with the termination of branching reactions. Ignition of methane-oxygen mixtures had been studied previously in detail only at temperatures below 800 K. The present work showed certain similarities of the ignition of methane-oxygen mixtures to that of hydrogen-oxygen mixtures. The reaction has a pronounced explosive character at higher temperatures

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